

The final stage of the pearl oyster cestode was supposed to be undergone within the body of an elasmobranch which fed upon Balistes. But, so far, the only elasmobranch tetrarhynchid which the authors have examined was obtained from the spiral valve of a sting ray (*Taeniura melanospilos*), and this larva was of a species quite distinct from either the Balistes or oyster larvæ. It is to be noted, however, that from this ray two perfect specimens of Balistes were taken.

Thus, though we may yet find that the sequence of hosts is as was indicated in the first volume of this report, we are at present left somewhat in doubt. In due time, doubtless, Messrs. Shipley and Hornell, the authors of this really fascinating section, will solve the riddle.

We have dealt at some length on this matter because, apart from its interest as a sequence of stirring events in the life-history of a very humble organism, it has considerable importance from an economic point of view: since, when the chain of evidence is complete, it may be possible, as was first suggested by Keelart in 1857, to raise the percentage of pearls by infecting oysters in other beds with their parasites.

Prof. Jeffrey Bell contributes some notes on the echinoderms, appended to a description of the species collected, by Prof. Herdman. Although these notes barely fill three pages, Prof. Bell has crowded into this space some trenchant criticisms and some really valuable facts.

The reports on the arthropods are full of interesting matter, and deal with a large number of new species; but we venture to think that a longer summary of the principal results arrived at would have added to the usefulness of these chapters. Dr. Calman's work on the Cumacea will be welcomed, inasmuch as no species of this group have hitherto been described from any part of the Indian Ocean.

The collection of cephalopods has been worked out by Dr. W. E. Hoyle. Though small, it contained one new species of unusual interest. This was a small octopus, which has been named *Polypus arborescens* on account of the presence of curious branched processes scattered all over the body, some of which are surmounted by a tuft of fibrils. After a most careful study Dr. Hoyle is still uncertain as to their purpose. He dwells at considerable length upon their microscopical structure. He is satisfied that they are not parasitic organisms, nor are they, he considers, glandular or phosphorescent organs. The fact that no nerves have been traced to them would seem to show that they are not tactile bodies, yet on the whole he considers that it is this function which they perform. Prof. Herdman, who has studied the living animal in a small tank, describes these mysterious processes as being contractile, and "kept frequently moving—uncoiling to a considerable length and then curling up again suddenly." This seems to suggest that they may be alluring organs comparable to the waving flag of the angler-fish or the long, worm-like tongue of the "mata-mata" tortoise.

The fishes collected during this investigation have been described by Mr. J. Johnstone. Twelve species in all are dealt with.

The most interesting feature of this report is that concerning the supposed naso-pharyngeal passage in *Cynoglossus*. Kyle, in 1900, described in this genus a curious nasal sac, which, he believed, communicated with the mouth by means of a pore in the floor of the sac, a feature which he regarded as of considerable morphological importance.

Mr. Johnstone examined several species belonging to this genus, and in no case did he find this naso-pharyngeal passage. But what is really interesting is the fact that he found this cavity, on more than one occasion, inhabited by a copepod. Since this creature

anchors itself by hooks, the presence of an occasional hole in the floor of this chamber is not to be wondered at!

There is a wealth of plates in this volume, all of which are as good of their kind as one could wish. The same cannot be said of one or two of the text figures, however, which leave much to be desired—notably the figure of the dissection of a pearl oyster on p. 43.

Yet another volume is required to complete this report; this is promised early next year. Judging by the standard set by the two volumes now issued, the complete work will form one of the most valuable commentaries on a great industry yet issued.

W. P. P.

## NOTES.

At the invitation of the British Association, the local committee in Johannesburg has nominated the following as vice-presidents and secretaries respectively of the different sections for the meeting in South Africa, the general arrangements of which were described in NATURE of February 2 (p. 323):—*Mathematics and Physical Science*—vice-president, Dr. Breyer; secretary, Mr. R. T. A. Innes. *Chemistry*—Mr. J. R. Williams, Mr. W. A. Caldecott. *Geology*—Dr. Corstorphine, Dr. Molengraaff. *Zoology*—Dr. Gunning, Dr. Pakes. *Geography*, Mr. E. H. V. Melvill, Mr. F. Flowers. *Economic Science and Statistics*—Mr. S. Evans, Mr. Robert A. Ababrelton. *Engineering*—Mr. S. Jennings, Mr. E. Williams. *Anthropology*—Dr. Schonland, Mr. A. von Dessauer. *Physiology*—Sir Kendal Franks, Dr. A. Mackenzie. *Botany*—Mr. Burtt Davy, Prof. Pearson. *Educational Science*—Mr. E. B. Sargent, Prof. Hele-Shaw.

THE Hunterian oration delivered by Mr. John Tweedy at the Royal College of Surgeons on February 14, and abridged elsewhere in this issue, contains several interesting references to the growth of natural knowledge by the use of the experimental method, with illustrations from John Hunter's work. It has been said that though Hunter had never read Bacon, his method was as strictly Baconian as if he had. Mr. Tweedy pointed out that this view is based upon a complete misinterpretation of the Baconian system. Francis Bacon himself neither knew nor understood the physical sciences, and his spirit was much less modern than that of his illustrious namesake, Roger Bacon, who lived three hundred years before him. John Hunter did not follow the mechanical methods of the Baconian system, but he possessed every moral and intellectual qualification for useful scientific research—a fertile imagination ready to suggest possible relations of facts, openness of mind, and a conscientious scientific spirit that submitted every hypothesis to the test of observation and experiment, taking nothing on trust. Mr. Tweedy occupied the chair at the festival dinner held at the college in the evening of February 14, when there were present, among others:—Prof. C. Allbutt, Sir W. Broadbent, Sir Lauder Brunton, Sir D. Duckworth, Sir Harry Johnston, Sir Norman Lockyer, Sir W. Ramsay, Prof. C. Stewart, Sir W. T. Thiselton-Dyer, Prof. W. A. Tilden, and Sir F. Treves.

THE death on February 9, at the age of forty-four, of Mr. F. O. Pickard-Cambridge makes a break it will be impossible to fill in the ranks of British arachnologists. From boyhood he had devoted himself to the study of English spiders, and was rightly regarded as the leading authority upon this subject. He completed, moreover, in 1904, his monograph of the Central American spiders for

Godman and Salvin's "Biologia," and this work, supplemented by the determination of specimens in the British Museum and of the collections made by himself on the Amazons, gave him a quite special knowledge of the Neotropical species. He unfortunately left unfinished his revision of the generic nomenclature of spiders, and also the county records of Arachnida he was compiling for the "Victoria History." Mr. Cambridge was an admirable draughtsman, as is testified by the plates illustrating the many papers he contributed to scientific societies and periodicals.

MATHEMATICIANS will have heard with regret that Mr. Robert Tucker died on January 29. He received his university education at St. John's College, Cambridge, of which he was a scholar, and was placed among the wranglers in 1855. He became a schoolmaster, and was for many years head mathematical master at University College School. His original contributions to mathematics deal chiefly with configurations of points, lines and circles related in special ways to a fixed triangle, and one system of circles, which he discovered, is called after his name. He was also the editor of Clifford's "Mathematical Papers." In 1867 he became one of the secretaries of the London Mathematical Society, founded in 1865. From that time forward he made the society his peculiar care, and the success which it has attained is almost entirely due to him. He retained the office of secretary for thirty-five years, editing the *Proceedings*, and conducting the correspondence with authors and referees—a delicate duty in respect of which he established an admirable tradition. He also wrote an account of the early history of the society. In all his work he was business-like and thorough, and at the same time modest and unselfish.

THE new wing which is to complete the Armstrong College of Science in Newcastle-on-Tyne will be opened by the King next year.

THE Société nationale d'Agriculture de France has awarded to Prof. Wm. B. Alwood, of Charlottesville, Va., a diploma and silver medal for his recent work in pomology, especially as relates to the fermentation of by-products from apples.

THE anniversary meeting of the Geological Society was held at Burlington House on Friday, February 17. Dr. J. E. Marr, F.R.S., was elected president. After the presentation of the medals and prizes already announced (p. 253) the president delivered his anniversary address, which dealt with the classification of the sedimentary rocks.

ARRANGEMENTS have been made whereby messages may be sent to Cunard mail steamers at any stage in their voyage across the Atlantic. During the first three or four days after the vessels leave Liverpool the messages will be sent from Poldhu, Cornwall, direct to the steamer. During the next three or four days the messages will be forwarded by cable to the North American Continent, and repeated thence to the approaching ship.

WE learn from the *Times* that the Treasury has agreed to place at the disposal of the Board of Trade 500*l.* per annum for four years for the purpose of taking practical steps to encourage and investigate the development of the cotton-growing area of the Empire. This sum will be used (1) for the payment of scientific assistants, who would themselves do part of the proposed work and would also set free members of the existing staff of the Imperial

Institute for the purpose; and (2) for defraying the cost of equipment. It has also been notified, in connection with the mineral survey which the Government of Northern Nigeria has in contemplation, that a sum of 300*l.* per annum will be paid to the Imperial Institute in order to defray the expenses of examining specimens of minerals, &c., sent to the scientific and technical department so long as the survey is in progress, probably a period of three years.

ON Saturday next, February 25, Mr. D. G. Hogarth will begin a course of two lectures at the Royal Institution on "Archæology." On Tuesday, February 28, Prof. Karl Pearson will deliver the first of three lectures on "Some Recent Biometric Studies." On Thursday, March 2, Prof. H. H. Turner will commence a course of three lectures on "Recent Astronomical Progress," and on Saturday, March 11, Prof. J. J. Thomson will begin a course of three lectures on "Electrical Properties of Radio-active Substances." The Friday evening discourse on March 3 will be delivered by Chevalier G. Marconi, on "Recent Advances in Wireless Telegraphy," and on March 10 by Prof. J. J. Thomson, on the "Structure of the Atom." Mr. Perceval Landon will give two lectures, on April 4 and 11, on "Tibet," Mr. A. Henry Savage Landor's lectures on "Exploration in the Philippines" having been deferred until after Easter.

THE annual report of the council of the Institution of Mechanical Engineers was read at the annual general meeting of the institution on February 17. The first report, by Prof. David S. Capper, to the steam-engine research committee, has now been completed, and, together with a preliminary report on progressive speed and pressure trials carried out previous to March, 1896, will be presented at the March meeting. Since the presentation, in January, 1904, of the late Sir William Roberts-Austen's last report, the alloys research committee has continued its work at the National Physical Laboratory. Dr. Glazebrook, director of the laboratory, has arranged a series of investigations on specimens of nickel steel presented by Mr. R. A. Hadfield. It is anticipated that a further report will be presented this year by the committee, communicating the results of these researches. Further investigations having great practical importance are now being considered. Prof. F. W. Burstall reports that the two specially constructed large gas-engines and a gas-holder erected in the new power house of the Birmingham University are now available for the gas-engine research committee's experiments. A scheme of experiments, indicating the methods of working, is under consideration, and it is hoped that the next report will be ready for presentation at the opening of next session. A gift of 100*l.* towards the expenses of carrying on the research has been received from Dr. Ludwig Mond, F.R.S. The series of experiments on initial condensation in steam cylinders, which Prof. T. Hudson Beare is carrying out with special apparatus for the purpose, are in active progress, but are still incomplete. The results obtained so far, however, justify the hope that the committee will be able to present, during the year 1905, an interim report dealing with the results obtained in the experiments on non-jacketed cylinders. It is intended to hold the next summer meeting in Belgium, in view of the International Exhibition to be held at Liège this year.

WE have received from Messrs. John Wheldon and Co., of Great Queen Street, a copy of a catalogue of zoological and sporting books and papers arranged geographically. To those who are working on faunas and distribution the list will be distinctly useful.



In vol. v., No. 5, of the *Records* of the Australian Museum, Mr. R. Etheridge describes the remains of a plesiosaurian reptile of the genus *Cimoliosaurus* from the Upper Cretaceous of White Cliffs, New South Wales, which have been completely opalised. This is the second skeleton of the genus which has been obtained from these deposits in an opalised condition. Precious opal occurred only here and there—more especially in the transverse processes of the neck—in the second specimen, the richness of the colour of which bore no comparison to that in the example first obtained.

MR. W. E. CLARKE, of the Edinburgh Museums, sends us a paper from the *Annals of Scottish Natural History* for January on the vole and the shrew of Orkney. The vole, which it will be remembered was recently discovered and named by Mr. Millais, turns out to be remarkably interesting, for it appears to come nearest to the water-vole, although its dentition is of the type of the common field-vole. The shrew, Mr. Clarke believes, will probably turn out to be the pigmy species. Mr. Clarke has been assisted in his investigation into the structure of the vole by Prof. O. C. Bradley.

DR. GILCHRIST'S presidential address to the South African Philosophical Society at the meeting in August last, which is reported in the latest issue of the *Transactions* of that body, deals with certain features of the marine fauna of South Africa. It is shown that as the Cape seas receive currents from different parts of the ocean, so the fauna is of a particularly varied type, containing North Atlantic, Antarctic, and Indian types, and even an element from the Far East.

THE subject of the affinity of the endothiodont reptiles is resumed by Dr. R. Broom in part iv. of vol. xv. of the *Transactions* of the South African Philosophical Society. The author emphasises their relationship to the dicynodonts, and shows that, while in the endothiodonts the tendency has been to increase the development of the molars, in the dicynodonts the latter teeth have been completely eliminated. In our own opinion, Dr. Broom's work tends to show that both groups should be included in a single family.

THE report of the director of the botanic gardens and domains, Sydney, for 1903 refers to the changes in the gardens consequent upon the extension into the inner domain. Tree-planting in the Centennial Park has been continued, the additions during the year being principally *Acacia binervata*, *Eucalyptus botryoides*, woolly-butt, *Tristania conferta*, brush-box, and species of *Casuarina*. Many of the various species of *Eucalyptus* have suffered from the attacks of a coccid identified as *Eriococcus coriaceus*.

THE Philippine Islands are yielding a number of interesting plants. A second list by Mr. E. D. Merrill has been issued as a publication, No. 17 of the Bureau of Government Laboratories, Manila. The author distinguishes twelve species of *Terminalia* in his synopsis of the genus, three being new. Among other new plants are four species of *Pandanus*, three of *Illipe* (= *Bassia*), and a climbing *Dischidia* belonging to the section *Conchopyllum* in which the leaves flattened against the supporting tree trunk serve as a shelter for ants.

A PROGRESS report on the strength of structural timber by Dr. W. K. Hatt forms Circular No. 32 of the forestry series published by the United States Department of Agriculture. Tests were made with long-leaf pine, *Pinus palustris*, loblolly, *Pinus taeda*, and a red fir, known also as Oregon

pine, *Pseudotsuga taxifolia*. Long-leaf pine is the standard timber of construction, but is not always obtainable in long pieces, when red fir takes its place; red fir produces long, straight timber, but shows considerable variation in quality; loblolly being principally sap-wood has to be treated with preservatives if it is required for external work. Experiments were also made with sweet gum, *Liquidambar styraciflua*, to ascertain whether the timber could be bent and put to the same uses as hickory, but the results were not favourable.

WHEN we consider the enormous mass of material which has been accumulated regarding the quantity of rain which falls, it is remarkable how little attention appears to have been given to the number and size of the drops. A very simple and ingenious method of studying raindrops is described in a paper in the *Monthly Weather Review* for October, 1904, by Mr. W. A. Bentley. The raindrops are allowed to fall into a layer of dry flour one inch deep, which is exposed to the rain for a few seconds. The flour is allowed to stand for some time, and the pellets of dough, each representing a raindrop, are then picked out and may be preserved. The method was tested by allowing measured

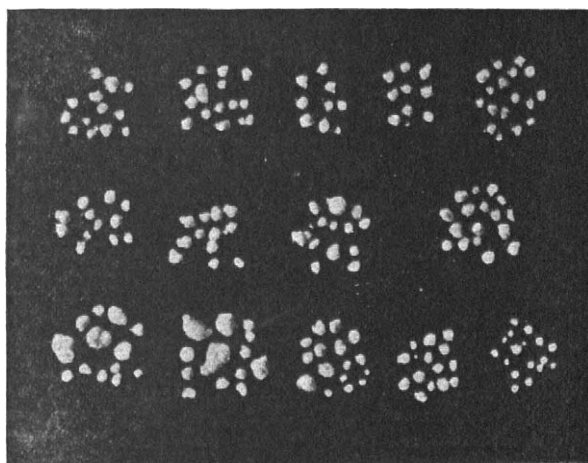


FIG. 1.—Forms of raindrops. Complete set of samples from the great general storm of August 20, 1904. Duration of storm, fifteen hours. One raindrop sample per hour was taken throughout the storm.

drops of water to fall from a height into the flour; it was found that the dough pellet differed but little in size from the drop which produced it. In the paper a series of interesting photographs of such dough-pellets is given, illustrating the variation in the size of the raindrops during the course of showers of different types. The largest drops met with somewhat exceeded a fifth of an inch in diameter; this is in agreement with the observations of Wiesner (quoted by Hann in his "Lehrbuch"), which gave 7 mm. as an upper limit. Mr. Bentley gives tables showing the relative frequency of occurrence of drops of various sizes in rain from various kinds of clouds.

WE have received from the secretary of the English Ceramic Society a copy of its *Transactions* for the session 1903-4. The society, which has its headquarters at Tunstall, Staffordshire, is still in its infancy, but it would appear that its existence is likely to exert considerable influence for good on the future development of the English potteries. The *Transactions* contain papers describing attempts to solve special problems in the industry, and the keen discussion which followed their delivery is indicative of the interest with which they were received. There can be

little doubt that such a society must tend to the spread of knowledge and the improvement of method in pottery manufacture.

AN interesting paper by R. Kremann on the melting point of dissociating substances and the degree of dissociation during melting is contained in the *Sitzungsberichte* (1904, vol. ciii., part vii.) of the Imperial Academy of Sciences of Vienna. From theoretical considerations involving the law of mass action, melting-point curves are deduced for substances, such as the compounds of phenol with aromatic bases and with picric acid, at different degrees of dissociation. By comparing the shape of these curves with those obtained, for instance, on adding aniline to the compound of aniline and phenol, the actual degree of dissociation of these substances during melting may be very approximately ascertained. Incidentally, the important result is established that the addition of one of the products of dissociation of the compound may in many cases cause a rise in the melting point without there being question of the formation of an isomorphous mixture. The results obtained are applied to an investigation of the additive compounds of nitrosodimethylaniline with various aromatic bases.

IN an inaugural dissertation for a doctorate at Bonn University, Herr Jacob Steinhausen presents the results he has obtained during a research on "enhanced lines." Adopting the English name originally proposed by Sir Norman Lockyer, the author gives a detailed description of the enhanced lines and their different appearances in various spectra, and then describes the apparatus and methods employed by him in his own research. Using a small grating of 1 metre radius, which produced a dispersion such that 10 Angström units extended over 0.595 mm. on the plate, he photographed and compared the arc and spark spectra of the elements Al, Sb, Pb, Cd, Mg, Hg, Bi, Sn, Zn, Ba, Ca, Sr, and Ti, using in most cases metallic poles for the spark, and powdered metal, or salt, on carbon poles for the arc. The wave-lengths are only given to the nearest unit, and will, therefore, need re-determining, with a larger dispersion, before they become of any great use for stellar identifications. In discussing the nature of the lines the author adopts an error made by Prof. Kayser (*"Handbuch der Spectroscopie"*), viz. that in accounting for spectral variations Sir Norman Lockyer has always considered only the temperature of the spark as the cause; yet it is now more than thirty years since the discoverer of enhanced lines explicitly stated that the possible effects of electrical variations must be included in the general term "temperature."

SOME ten years ago Prof. H. Moissan, in the course of his work on the production of carbides in the electric furnace, prepared aluminium carbide and showed that in contact with water pure methane was evolved, thus giving a new and direct synthesis of this important hydrocarbon. In the current number of the *Comptes rendus* (February 13) Prof. Moissan and M. Chavanne give an account of their determinations of the physical constants of pure marsh gas prepared in this way. The methane, after being freed from traces of moisture and less volatile impurities by passing through a tube cooled to  $-85^{\circ}\text{C}.$ , is solidified by cooling with liquid air, and any more volatile gases present pumped away. The gas allowed to boil off from the crystals was proved to be pure by a combustion analysis, and possessed at  $0^{\circ}\text{C}.$  and 760 mm. pressure a density of 0.5547, the theoretical density being 0.555. The melting and boiling points were measured by means of an iron-Constantin thermocouple, previously standardised against a petroleum ether thermometer, the crystals melting sharply

at  $-184^{\circ}\text{C}.$  and boiling at  $-164^{\circ}$  at atmospheric pressure. The authors add that the methane, purified in this way, always possessed a sweet, faint garlic odour, which cannot be attributed to impurities, and must be regarded as due to the gas itself. The reaction between solid methane and liquid fluorine was studied at the same time; the two substances instantly combined, the reaction being accompanied by a bright flash and a violent explosion, completely pulverising the glass tubes.

A TWELFTH edition of Mr. W. T. Lynn's booklet on "Remarkable Comets" has been published by Messrs. Sampson Low, Marston and Co., Ltd.

THE Cambridge University Press has published the first number of a new scientific periodical entitled the *Journal of Agricultural Science*. The magazine is edited by Messrs. R. H. Biffen, A. D. Hall, T. H. Middleton, and T. B. Wood, in consultation with Messrs. W. Bateson, F.R.S., J. R. Campbell, and W. Somerville. It is intended to circulate among agricultural teachers and experts, and will be issued, as material accumulates, in parts of about one hundred pages. Each volume will consist of four parts. The first number appeals to workers in many departments of agricultural research, and among the articles it contains may be mentioned those on Mendel's laws of inheritance and wheat breeding, by Mr. R. H. Biffen; the influence of pollination on the development of the hop, by Mr. A. Howard; the importance of the removal of the products of growth in the assimilation of nitrogen by the organisms of the root nodules of leguminous plants, by Mr. J. Golding; the analysis of the soil by means of the plant, by Mr. A. D. Hall; variation in the chemical composition of the swede, by Mr. S. H. Collins; soil analysis as a guide to the manurial treatment of poor pastures, by Messrs. T. B. Wood and R. A. Berry; and the improvement of poor pastures, by Prof. T. H. Middleton. The magazine should prove of interest and help to all teachers of agricultural science as well as to those engaged in research in this field of knowledge.

THE third part of Herr C. K. Schneider's "Illustriertes Handbuch der Laubholzkunde" has just been published by the firm of Gustav Fischer, Jena. The first two parts were reviewed in NATURE of November 24, 1904 (vol. lxxi., p. 76), and a further notice will appear after the work, consisting of about nine parts, has been completed.

### OUR ASTRONOMICAL COLUMN.

EPHEMERIS FOR COMET 1904 e.—The following is an extract from a continued ephemeris for comet 1904 e, as calculated from M. Fayet's elliptical elements by Dr. E. Strömberg, and published in No. 3994 of the *Astronomische Nachrichten* :—

<i>Ephemeris 12h. (M.T. Berlin).</i>												
1905	$\alpha$ (true)			$\delta$ (true)		$\log r$	$\log \Delta$	Bright- ness				
	h.	m.	s.									
Feb. 25 ...	3	10	47	...	+30	7	...	0.1669	...	0.1233	...	0.46
Mar. 1 ..	3	22	3	...	+32	0	...	0.1711	...	0.1359	...	0.43
" 5 ...	3	33	44	...	+33	47	...	0.1757	...	0.1486	...	0.39
" 9 ...	3	45	49	...	+35	25	...	0.1805	...	0.1611	...	0.36
" 13 ...	3	58	16	...	+36	56	...	0.1855	...	0.1736	...	0.33

The comet is now becoming very faint, and is travelling in a north-easterly direction through the southern part of the constellation Perseus. On March 11 it will pass near to  $\xi$  Persei.

REVISED ELEMENTS FOR BORRELLY'S COMET (1904 e).—When publishing the previous set of elements for comet 1904 e, M. Fayet explained that, as his computations were based upon the results of only a few observations, they could only be regarded as approximate. Now, however,